

REMARKS

This application has been carefully reviewed in light of the Office Action dated February 28, 2005. Claims 1 and 3 to 7 are pending in this application, and Claim 2 has been cancelled. Claims 1 and 3 to 7 have been amended. Claims 1 and 4 are in independent form. Reconsideration and further examination are respectfully requested.

Claim 3 was objected to in the Office Action for minor errors and has been corrected. Accordingly, withdrawal of the objection is therefore respectfully requested.

Figures 13-14 were objected to in the Office Action and have been corrected as required. Accordingly, withdrawal of the objection is therefore respectfully requested.

In the Office Action, Claims 1 to 7 were rejected under 35 U.S.C. § 102(e) over U.S. Patent No. 6,361,136 (Watanabe). Additionally, Claims 1 to 7 were rejected under 35 U.S.C. § 102(e) over U.S. Patent No. 6,274,880 (Walker). Claim 2 has been cancelled without prejudice or disclaimer of the subject matter and without conceding the correctness of the rejection, and the substance thereof incorporated into independent Claims 1 and 4. Accordingly, this should be viewed as a traversal of the rejections. Withdrawal of the § 102(e) rejections is therefore respectfully requested.

A feature of the present invention concerns a container of liquid with a reflection member therein. The reflection member is provided on an inner surface of the liquid containing portion of the container and has a plurality of roof mirror assemblies with at least two reflecting surfaces positioned in between. A plurality of roof mirror assemblies divide incident light, which is scattering light, into a plurality of light beams that condense at a predetermined detection position. The amount of liquid in the container is detected on the basis of light reflected.

With specific reference to the claims, amended independent Claim 1 is a liquid container for containing liquid, comprising of a reflection member provided in a liquid containing portion and having a plurality of roof mirror assemblies arranged in a predetermined direction, each of the roof mirror assemblies having at least two reflecting surfaces positioned with a predetermined angle in between. In addition, the reflection member is effective to divide incident light, which is scattering light, into a plurality of light beams by the plurality of roof mirror assemblies and to condense at a predetermined detection position the beams sequentially reflected by the at least two reflecting surfaces of the roof mirror assemblies. An amount of the liquid in the liquid container is detected on the basis of the light reflected by the reflection member. The reflection member is provided on an inner surface of the liquid containing portion.

Amended Claim 4 is a method for detecting an amount of the ink in a liquid container, comprising of a step of preparing a reflection member provided in a liquid containing portion and having a plurality of roof mirror assemblies arranged in a predetermined direction, each of the roof mirror assemblies having at least two reflecting surfaces positioned with a predetermined angle in between. The reflection member is also effective to divide incident light, which is scattering light, into a plurality of light beams by the plurality of roof mirror assemblies and to condense at a predetermined detection position the beams sequentially reflected by the at least two reflecting surfaces of the roof mirror assemblies and detecting an amount of the liquid in the liquid container on the basis of the light reflected by the reflection member. The reflection member is provided on an inner surface of the liquid containing portion.

The applied art is not seen to disclose or to suggest the foregoing features of independent Claims 1 and 4. More particularly, the applied art is not seen to disclose or to suggest at least the feature of a reflection member having a plurality of roof mirrors with at least two reflective surfaces positioned at a predetermined angle in between effective to divide incident light, which is scattering light, into a plurality of light beams by the plurality of roof mirror assemblies and to condense them at a predetermined detection position to detect the amount of ink in a liquid container based on the light.

As seen by applicant, Watanabe discloses a method for detecting the presence or absence of liquid through an optical method using one set of reflection portions, a prism 180 placed at the bottom wall of an ink tank. The internal surface of the wall of the ink tank 191a has an area rougher than the light reflection surface 191, so the rough internal wall 191a irregularly reflects light that penetrates the bottom wall of the ink tank 7, deflecting light away from the photoreceptor 16. The optical prisms 180 are placed in between the rough surface portions 191a and are designed to irregularly reflect the light when the ink or ink tank 7 is present. See Watanabe; column 27, line 41 to column 29, line 18.

While Watanabe employs a rough internal wall 191a and an optical prism 180 to deflect light away from the photoreceptors, the present invention contains a plurality of roof mirror assemblies arranged in a predetermined direction with at least two reflecting surfaces positioned in between. Further, the detection of the presence or absence of ink in Watanabe is done by one set of reflection portions whereas in the present invention, the detection of the amount of ink is done by light divided into a plurality of beams which are in turn condensed at a predetermined detection position. Therefore, Watanabe does not

teach the feature of a reflection member having a plurality of roof mirrors with at least two reflective surfaces positioned at a predetermined angle in between effective to divide incident light, which is scattering light, into a plurality of light beams by the plurality of roof mirror assemblies and to condense the beams at a predetermined detection position to detect the amount of ink in a liquid container based on the light.

As seen by applicant, Walker discloses a reflection member consisting of controlled surface pairs 230, 231 that reflect the light. The controlled surface pairs are essentially prisms from which the light from the light-emitting source is reflected. The plurality of reflected light rays 215 is reflected onto a light collecting lens 223 attached to the single light receiving device 227. The light is then passed through a receiving lens 223 which condenses the rays onto a photoreceptor 227. See Walker; column 4, lines 1 to 40.

While Walker employs a reflection member consisting of controlled surface pairs 230, 231 that merely reflect light, the present invention uses of a reflection member provided on an inner surface of the liquid containing portion of the container with a plurality of roof mirrors with at least two reflective surface position in between. In the present invention, the roof mirrors of the reflection member divide incident scattering light into a plurality of light beams that condense at a predetermined detection position, whereas in Walker, it is lens 223 that condenses the light. Thus, in Walker, the light is condensed by the lens 223 and not by the roof mirrors as in the present invention. Therefore, Walker does not teach the feature of a reflection member having a plurality of roof mirrors with at least two reflective surfaces positioned at a predetermined angle in between effective to divide incident light, which is scattering light, into a plurality of light beams by the

plurality of roof mirror assemblies and to condense the beams at a predetermined detection position to detect the amount of ink in a liquid container based on the light.

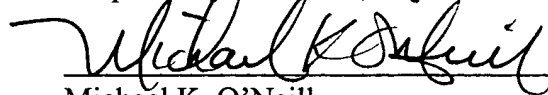
Accordingly, based on the foregoing amendments and remarks, independent Claims 1 and 4 as amended are believed to be allowable over the applied art.

The other claims in the application are each dependent from the independent claims and are believed to be allowable over the applied references for at least the same reasons. Because each dependent claim is deemed to define an additional aspect of the invention, however, the individual consideration of each on its own merits is respectfully requested.

In view of the foregoing amendments and remarks, the entire application is believed to be in allowance, and such action is respectfully requested at the Examiner's earliest convenience.

Applicants' undersigned attorney may be reached in our Costa Mesa, California office at (714) 540-8700. All correspondence should continue to be directed to our below-listed address.

Respectfully submitted,

A handwritten signature in dark ink, appearing to read "Michael K. O'Neill", is written over a horizontal line.

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